United States Environmental Protection Agency
Region 6
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October 19, 2007

MEMORANDUM

SUBJECT: Regional Response to National Remedy Review Board Recommendations
Tar Creek Superfund Site - Operable Unit 4, Ottawa County, Oklahoma

FROM: Sam Coleman, Director
Superfund Division, U.S. EPA, Region 6

TO: David Cooper, Chair
National Remedy Review Board, U.S. EPA Headquarters

The U.S. Environmental Protection Agency, Region 6 appreciates the National Remedy Review Board (NRRB) review of the proposed cleanup action for the Tar Creek Superfund Site, Operable Unit 4 in Ottawa County, Oklahoma.

Since our meeting with the NRRB, several activities have occurred within the OU4 area--that also involved chat--that prompted the Region to reevaluate its approach to address chat, mine and mill waste and smelter waste. Some of the activities that occurred included the release of the U.S. Army Corps of Engineers' Subsidence Report in January 2006 and the announcement in April that the State of Oklahoma would buy out properties within subsidence zones. Also, on June 5, 2007, the Environmental Protection Agency (EPA) established mandatory criteria for the environmentally protective use of chat in transportation projects carried out, in whole or in part, with Federal funds. The Chat Rule applies to chat used in federally funded transportation projects. The Chat Rule can be found at 72 Fed. Reg. 39235 (July 18, 2007) and is available at http://www.epa.gov/epaoswer/other/mining/chat/. Subsequently, Region 6 issued the proposed plan for Operable Unit 4 (OU4) and released the Administrative Record (which contained a revised Feasibility Study) for public comment on July 30, 2007. An extension was requested and the comment period concluded October 1, 2007. The OU4 Proposed Plan is available on EPA's website at: http://www.epa.gov/earth1r6/6sf/6sf-decisiondocs.htm.

Region 6 believes the Advisory Recommendations made by the NRRB are captured in these documents. Please contact: Ursula Lennox (214.665.6743) or John Meyer (214.665.6742) of my staff, should you need any additional clarification regarding the above items or our response to the NRRB Advisory Recommendations that are presented below.

Region 6 Response to the NRRB Advisory Recommendations:

1. The Board notes that the package describing the Region's approach (including the preferred alternative) is still evolving. As a result, there are significant uncertainties regarding key components of site cleanup that make it difficult for the Board to evaluate potential alternatives and offer specific recommendations on some aspects of the current approach.

RESPONSE:

EPA appreciates the NRRB's effort in reviewing the Region's envisioned approach. Since that time EPA has addressed the uncertainties raised by the Board regarding the cost, the envisioned approach for addressing the various components of the preferred alternative, results from pilot studies to confirm cost and effectiveness, etc. These uncertainties are addressed in the Feasibility Study that is part of the Administrative Record for Operable Unit 4 (OU4) and in EPA's responses to the 11 tribes and the Oklahoma Department of Environmental Quality's (ODEQ) comments on the draft Proposed Plan that was continuously refined to address their concerns. The concerns raised by the 11 Tribes and ODEQ are also included in the OU4 Administrative Record.

2. The preferred alternative as presented to the Board has a highly uncertain cost due to the highly uncertain volume of chat that will be sold for safe commercial use versus the amount that will be remediated under Superfund authority. The Board recommends that the Region continue to work to maximize the volume of chat that can be appropriately reused and which will not need to be remediated.

RESPONSE:

The Region will continue to work with chat owners and processors to utilize chat in an environmentally protective manner. The Chat Use Rule, which became effective on September 18, 2007, will provide the framework to minimize the amount of chat that will need to be addressed by the remedy. EPA will also coordinate closely with the Bureau of Indian Affairs because the majority of the remaining chat is located on tribal property.

3. The cost estimate presented to the Board did not include remediation of contaminated source material remaining after the sale of chat piles for commercial uses. The current expectation is that remediation of the chat pile areas will be included as part of the commercial use of the chat pile. However, to have a complete picture of overall costs at the site, the Board recommends that the decision document cost estimates include the cost to remediate the areas around the chat piles which have been sold, regardless of who will be performing the remediation.

RESPONSE:

EPA reexamined the expectation of including the remediation of chat pile areas as part of the commercial use. As reflected in the Feasibility Study, EPA intends to address all

non-marketable chat left on-site. For Feasibility Study alternative comparisons and cost estimating for the preferred alternative, the volume of non-marketable chat is estimated at 9,380,000 yd3, or 24 percent of all chat. However, as non-marketable chat is consolidated at processing operations, the actual volume of truly non-marketable chat (poor quality/composition for end uses) is expected to be lower than the estimated value reflected in the Feasibility Study.

4. The material available to the Board implies that consumption of local beef and milk and exposure to soils are the pathways that drive Native American risks and that these risks are based on modeling only. In the discussion at the meeting, the Region clarified that consumption of contaminated plants is a very significant exposure pathway, and that risks associated with this pathway were based on sampling of plant tissues. However, it was unclear to the Board whether the plant consumption exposure pathway related to children or adults. The board also noted that Native American exposure scenarios lead to different remedial goals than for the general population. The Board recommends that the decision documents clarify the exposure pathways that account for the greatest risk and how those exposures were used as the basis of the cleanup levels for Tribal exposures. In addition, the Board recommends that the decision documents clarify how the general population's remedial goals will be protective for the general population's exposures.

RESPONSE:

Since meeting with the NRRB, Region 6 refined its approach and language based on feedback obtained from representatives of the 11 Federally-recognized tribes during the Consultation Process from January through July 2007, and ODEQ. The preferred alternative will be protective of both the general population and Tribes. Specifically, the Proposed Plan acknowledges that there are lifestyle differences for site residents who live by eating OU4 plants and animals, "...lifestyle differences, including ingestion of plants grown near source areas or ingestion of meat or dairy products from animals feeding near source areas, will increase exposure to chemicals of concern in soils, and will also increase human health risk. These subsistence activities may pose a health risk even in locations where there are concentrations of lead that would generally be seen as posing minimal risk to the general public." The plan further states that "...Generally, those living closer to the source materials, especially adolescents, will face a greater risk because they are more likely to use areas contaminated with source material for recreation or as sources of gravel or sand for construction. Increased exposures are associated with the tribal way of life due to subsistence lifestyles differences that increase contact with impacted soil and eating biota (plants or animals) that may have accumulated lead or chemicals of concern. The preferred remedial alternative for source materials and soils which includes removal, deep tilling and natural soil rebuilding using standard land preparation practices should provide protection for the subsistence lifestyle."

5. The package presented a preference for removal of chat piles and chat bases on Tribal properties, whereas, containment was preferred for non-Tribal properties. The

Board recommends that the decision documents describe why different approaches are being proposed based on property ownership.

RESPONSE:

The Proposed Plan that was published for public comment did not draw a distinction between Tribal and non-Tribal properties. The Proposed Plan includes a decision tree that will be used to determine how chat on each property will be addressed, regardless of ownership.

6. The materials presented to the Board did not indicate whether each alternative met the NCP protectiveness criterion. The Board recommends that the Region clarify in the decision documents whether various alternatives provide protection of human health and the environment.

RESPONSE:

In accordance with the NCP, 40 CFR Part 300, the Feasibility Study evaluates the remedial alternatives against nine criteria to determine which alternative is preferred. The Proposed Plan for OU4 contains a discussion on the findings of four alternatives when evaluated against the criteria, and the decision documents will do likewise. The Region's preferred alternative is protective of human health and the environment.

7. The package provided to the Board did not include future land use plans for Tribal and non-Tribal properties. The Board recommends that the decision documents more clearly describe future anticipated land use in light of the 1995 land use guidance "Land Use in the CERCLA Remedy Selection Process" (OSWER Directive Number 9355.7-04.

RESPONSE:

Current land uses include agriculture, residential, light industry, commercial activities or businesses, and recreational uses, with agriculture being the dominant land use. EPA has also received the Quapaw Tribe's Land-use Planning and Zoning Ordinance Plans. However, with the implementation of the State-led buyout of residential and commercial properties, the future anticipated land uses have yet to be determined. EPA will continue to work closely with the State, local land use planning authorities, local officials, and tribes, as appropriate, on future land use plans that compliment the remedial action objectives established for the site.

8. At the meeting, the Tribe and the State indicated concerns with long-term institutional controls (ICs) which may be part of the preferred alternative. The Board also notes that ICs may be needed during the remedial action. The Board recommends that the decision documents clarify the objectives and types of ICs that may be used in both the short-term and long-term and their relative permanence and effectiveness.

RESPONSE:

Since meeting with the NRRB, Region 6 refined its approach and language based on feedback obtained from representatives of the 11 Federally-recognized tribes during the Consultation Process from January through July 2007, and ODEQ. Now, source materials will be addressed in a manner to reduce the overall footprint of contamination and will reduce the need for land use restrictions, institutional controls, and operation and maintenance. Decision documents will reflect the types of ICs that may be used to ensure the effectiveness of remedy.

9. The Board notes that injection of chat into mine workings, which was included as an optional component of the preferred alternative, is significantly more costly than other options. The Board recommends that the decision documents describe the advantages and disadvantages of managing chat by various means, including potential placement into mine workings or subsidence areas. For example, the Board recommends that the Region describe the potential long-term effectiveness, cost, and community acceptance related to use of chat for subsidence fill or injection into mine works, which may reduce operations and maintenance costs associated with surface containment or provide a beneficial increase in alkalinity of mine water.

RESPONSE:

The Proposed Plan includes a Decision Flowchart (Figure 4) that will be used to determine the technology to be used at a specific chat pile or base. The flowchart takes into account the higher cost of injection in the analysis. The Feasibility Study contains the findings generated from the pilot studies that evaluated the injection of chat and fines into mine workings and includes provisions to monitor surface and ground water to ensure the effectiveness of the injection. A site-wide hydrogeologic study will be performed prior to implementation of the injection of fines into the mine workings to ensure this disposal method will cause no further harm to the ground water and the surface waters. The study will also evaluate the long-term effectiveness of this method. Based on a hydrogeologic study and a cost-effectiveness analysis, fine tailings may be injected into mine workings using the decision tree. If the injection is not implemented, fines will be covered in place, and the cover will be revegetated. This approach was found acceptable by the 11 tribes and ODEQ that EPA met with during the refinement of the Proposed Plan for OU4.

10. The material presented to the Board did not include a discussion of metal bioavailability and its potential impact on remedy selection. The Board recommends the Region evaluate whether considering bioavailability may have an impact on remedial goals for soils. The Board also recommends that the Region discuss this issue in the decision documents, e.g., in the section which summarizes uncertainty of the risk assessment.

RESPONSE:

Since meeting with the NRRB, Region 6 completed the Human Health Risk Assessment (HHRA) and Feasibility Study, which are part of the OU4 Administrative Record. The HHRA identified contaminates of potential concerns for each potential source of exposure. However, no effort was made to identify the particular chemical species of lead (or other metal) in any of these sources. The absence of chemical speciation is less than ideal because the bioavailability and toxicity of particular chemical species of the same metal can vary substantially. However, the bioavailability of lead in soil was evaluated at the Jasper County, Missouri Superfund Site, a similar site to Tar Creek OU4 in terms of waste sources and environmental conditions (**Casteel et al., 1996**). Results indicate bioavailability in the range of 29 to 40 percent. Therefore, the default bioavailability (30 percent) used in the HHRA is expected to be an appropriate estimate for the site. In addition to including this information in the decision document, a section will also be included which summarizes the uncertainty of the risk assessment.

11. The Board notes that the proposed remedy is directed primarily at lead contamination in source materials and soils. However, other contaminants in source material at the site, particularly zinc, may be the contaminant of most concern in sediment. The Board recommends that the decision documents note the potential relationship between the preferred alternative for source materials/soils, which will address sources of both lead and zinc, and sediments, which may have different environmental receptors and contaminants of concern.

[**Potential replacement for the preceding sentence, which seems willfully and unnecessarily vague**: The board recommends that the decision documents note that the preferred alternative, by addressing the source material, will reduce lead exposures to terrestrial receptors, as well as reducing the release of zinc, which may be important to receptors associated with sediments at the site]

RESPONSE:

Since meeting with the NRRB, language in the proposed plan was refined to capture zinc in sediment and the potential exposure to terrestrial receptors. Specifically, one of the remedial action objectives for the medium which consists of source material, smelter waste, transition zone soil, and soil which underlies source material and smelter waste is to prevent riparian biota including waterfowl from coming into contact, through the ingestion exposure pathway, with unacceptable concentrations of lead, cadmium, and zinc in surface water and sediment by eliminating all discharge of cadmium, lead, and zinc from source materials to surface water. This will be included in the decision document.

12. The Board notes that in the material presented to the Board, the wording of the human health remedial action objectives (RAOs) based on blood lead levels is unclear. The Board recommends that the Region revisit this wording in light of the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action, (OSWER

Directive 9355.4-12, July 14, 1994). which states: ...Generally, OSWER will attempt to limit exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% exceeding the 10 mg lead/dl blood lead level.

RESPONSE:

Since meeting with the NRRB, RAO language in the proposed plan was modified to read "Prevent children from direct contact, through the ingestion and inhalation exposure, with lead-contaminated soil where soil lead concentrations exceed 500 ppm. [The purpose of this objective is to limit exposure to soil lead levels such that a typical (a hypothetical) child or group of similarly exposed children living on site would have an estimated risk of no more than 5% exceeding 10 µg/dL blood lead level.]"

13. In the material presented to the Board, the use of the term "principal threat waste" did not appear to be consistent with EPA guidance "A Guide to Principal Threat and Low Level Threat Wastes "(OSWER Directive 9380.3-06FS, November 1991). In addition, the Board notes that if principal threat wastes are present at the site, the NCP establishes an expectation for the treatment of those materials. The Board notes that from the information presented to the Board, there did not appear to be principal threat waste present at the site. The Board recommends that this be clarified in the decision documents.

RESPONSE:

Language in the Proposed Plan was modified to reflect the type of mining waste and mill waste (Source Material) that were address under any of the alternatives at OU4 is a high volume low-level threat waste and EPA expects to use engineering controls instead of treatment for this type of waste (40 CFR § 300.430(a)(1)(iii)(B)). A more in-depth discussion is available in the Feasibility Study and the Proposed Plan.